

Serial No. 10/815,033  
Page 2 of 15

**IN THE CLAIMS:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**LISTING OF CLAIMS:**

- 1 1. (original) A method comprising:
  - 2 modulating the output of an optical source to optically encode electronic data
  - 3 using phase shift keying (PSK) to generate an optical signal; and
  - 4 alternating the polarization of the phase shift keyed optical signal using a
  - 5 modulator such that successive optical bits have substantially orthogonal polarizations to
  - 6 generate an alternate polarization PSK (APol-PSK) signal.
  
- 1 2. (original) The method of claim 1 wherein the modulator is a phase
- 2 modulator driven by a sinusoidal RF voltage.
  
- 1 3. (original) The method of claim 1 wherein the modulator is a phase
- 2 modulator driven by a train of square pulses.
  
- 1 4. (original) The method of claim 1 wherein the optical signal is launched
- 2 into the modulator having a polarization oriented at a predetermined angle such that the
- 3 polarization of successive optical bits of the output signal are substantially orthogonal.
  
- 1 5. (original) The method of claim 1 wherein the modulator is a Mach-
- 2 Zehnder modulator including a polarization rotation device in at least one arm.
  
- 1 6. (original) The method of claim 5 wherein the polarization rotation device
- 2 is a half-wave plate.

Serial No. 10/815,033

Page 3 of 15

1        7. (original) The method of claim 5 wherein at least one arm of the  
2 modulator is driven by a sinusoidal RF voltage.

1        8. (original) The method of claim 5 wherein at least one arm of the  
2 modulator is driven by a train of square pulses running at half the bit rate.

1        9. (original) A method of APol-PSK transmission comprising:  
2            using an electronic data signal to drive a Mach-Zehnder modulator having a  
3 polarization rotation device in at least one arm to provide simultaneous polarization  
4 alternation and optical data encoding by phase shift keying to generate an APol-PSK  
5 signal.

1        10. (original) A method comprising:  
2            precoding an electronic data signal;  
3            modulating the output of an optical source using the precoded electronic data  
4 signal and differential phase shift keying between two optical bits separated by an even  
5 number of bit periods to generate an encoded optical signal; and  
6            alternating the polarization of the encoded optical signal using a modulator such  
7 that successive optical bits have substantially orthogonal polarizations to generate an  
8 APol-DPSK signal.

1        11. (original) The method of claim 10 further comprising demodulating the  
2 APol-DPSK signal using an even bit delay line interferometer.

1        12. (original) A method of APol-DPSK transmission comprising:  
2            precoding an electronic data signal;  
3            using the precoded electronic data signal to drive a Mach-Zehnder modulator  
4 including a polarization rotation device in at least one arm to provide simultaneous  
5 polarization alternation and optical data encoding by phase shift keying between two  
6 optical bits separated by an even number of bit periods to generate an APol-DPSK signal.

Serial No. 10/815,033  
Page 4 of 15

1        13. (original) The method of claim 12 wherein the polarization rotation device  
2 is a half-wave plate.

1        14. (original) The method of claim 12 further comprising demodulating the  
2 APol-DPSK signal using an even bit delay line interferometer.

1        15. (original) An optical transmitter for APol-PSK transmission comprising:  
2        an optical source,  
3        an optical phase-shift-keying data modulator optically coupled to the optical  
4 source; and  
5        a polarization alternator optically coupled to the data modulator to provide  
6 polarization alternation of the output of the data modulator.

1        16. (original) The apparatus of claim 15 wherein the polarization alternator is  
2 a phase modulator driven by a sinusoidal RF voltage.

1        17. (original) The apparatus of claim 15 wherein the polarization alternator is  
2 a phase modulator driven by a train of square pulses running at half the bit rate.

1        18. (original) The apparatus of claim 15 wherein the polarization alternator is  
2 a modified Mach-Zehnder modulator having a polarization rotation device in one arm.

1        19. (original) The apparatus of claim 18 wherein at least one arm of the  
2 modulator is driven by a sinusoidal RF voltage.

1        20. (original) The apparatus of claim 18 wherein at least one arm of the  
2 modulator is driven by a train of square pulses running at half the bit rate.

1        21. (original) The apparatus of claim 15 wherein the polarization alternator is  
2 a Mach-Zehnder modulator having two complementary output ports, and wherein the

Serial No. 10/815,033

Page 5 of 15

3 apparatus further comprises a polarization beam combiner for combining outputs from  
4 the two output ports of the Mach-Zehnder modulator.

1 22. (original) The apparatus of claim 21 wherein at least one arm of the  
2 modulator is driven by a sinusoidal RF voltage.

1 23. (original) The apparatus of claim 21 wherein at least one arm of the  
2 modulator is driven by a train of square pulses running at half the bit rate.

1 24. (currently amended) An optical transmitter for APol-DPSK transmission  
2 comprising:

3 an optical source,  
4 a precoder device for precoding an electronic data signal;  
5 an optical phase-shift-keying data modulator optically coupled to the laser source  
6 and driven by a precoded electronic data signal from the precoder device to produce an  
7 optical DPSK signal wherein electronic data to be transmitted is optically encoded by the  
8 data modulator as differential phase shift keying between two optical bits separated by an  
9 even number of bit periods; and  
10 a polarization alternator optically coupled to the data modulator to provide  
11 polarization alternation of the output of the data modulator.

1 25. (original) An optical transmitter for APol-PSK transmission comprising:  
2 an optical source;  
3 a Mach-Zehnder (MZ) modulator device optically coupled to the laser source  
4 having a polarization rotation device in one arm; and  
5 drive circuitry coupled to the MZ modulator device to drive a MZ modulator to  
6 simultaneously provide polarization alternation and optical data encoding of an optical  
7 signal using phase shift keying.

1 26. (original) An optical transmitter for APol-DPSK transmission comprising:  
2 an optical source;

Serial No. 10/815,033

Page 6 of 15

3           a precoder;  
4           a Mach-Zehnder (MZ) modulator device optically coupled to the laser source  
5   having a half-wave plate in one arm; and  
6           drive circuitry coupled to the MZ modulator device to drive a MZ modulator  
7   using a precoded data signal from the precoder to simultaneously provide polarization  
8   alternation and optical data encoding of an optical signal using phase shift keying.

1           27. (original) An optical transmission system for transmitting APol-PSK  
2   signals comprising:  
3           an optical source,  
4           an optical phase-shift-keying data modulator optically coupled to the optical  
5   source; and  
6           a polarization alternator optically coupled to the data modulator to provide  
7   polarization alternation of the output of the data modulator.

1           28. (currently amended) An optical transmission system for APol-PSK  
2   transmission comprising:  
3           an optical source,  
4           a modulator means having a polarization rotation device to provide simultaneous  
5   polarization alternation and optical data encoding by phase shift keying to generate an  
6   APol-PSK signal.

1           29. (currently amended) An optical transmission system for APol-DPSK  
2   transmission comprising:  
3           an optical source,  
4           a precoder device for precoding an electronic data signal;  
5           an optical phase-shift-keying data modulator optically coupled to the laser source  
6   and driven by a precoded electronic data signal from the precoder device to produce an  
7   optical DPSK signal wherein electronic data to be transmitted is optically encoded by the  
8   data modulator as differential phase shift keying between two optical bits separated by an  
9   even number of bit periods; and

Serial No. 10/815,033

Page 7 of 15

10 a polarization alternator optically coupled to the data modulator to provide  
11 polarization alternation of the output of the data modulator.

1 30. (original) An apparatus for generating an APol-PSK optical signal  
2 comprising:

3 means for encoding electronic data using phase shift keying (PSK) to generate an  
4 optical signal; and

5 modulator means for alternating the polarization of the optical signal to generate  
6 an alternate polarization PSK (APol-PSK) signal.